

# 2020 Model Year Engine Families

## LHDXC Items Table of Contents

### CBI\_LHDXC\_COMMON\_RFA\_APP\_R00

The items in this document are applicable to the following Engine Families:

LHDXC0.88CEA

LHDXC01.2CEA

LHDXC0.50AXG

LHDXC0.75AXG

LHDXC0.75AXH

LHDXC1.87AEH

LHDXC1.87AEJ

LHDXC1.75AEK

LHDXC1.75AED

LHDXC1.92AED

LHDXC1.87AEG

LHDXC1.92AEF

LHDXC1.92AEE

# Table of Contents

Model Year Letter of Introduction .....	3
Projected Volumes and FEL .....	7
Emission Control Devices .....	8
Emissions Warranty .....	9
Emissions Label Summary .....	11
PERM Report .....	12



Harley-Davidson Motor Company  
Product Development Center  
Motorcycle Regulatory Compliance, Environmental  
11800 West Capitol Drive  
Wauwatosa, WI 53222-1007

**May 20, 2019**

Director of Certification  
Certification Division  
United States Environmental Protection Agency  
2000 Traverwood Drive  
Ann Arbor, Michigan 48105  
Attention: Donna Ringle, Certification Division

**Confidential - CBI document**

*Application Submittal: 2020 Model Year EPA certification (non-EV motorcycles)*

Dear Ms. Ringle:

Enclosed are the electronic materials for the 2020 model year certification of Harley-Davidson Motorcycles as submitted to the Verify/CDX system. We appreciate your timely support in reviewing our application as Harley-Davidson will begin producing 2020 MY motorcycles on or about July 5th, 2019. H-D production sales are planned to begin Aug 1, 2019. Note that although there are no confidentiality restrictions this year as there were in past years, H-D is requesting that the certificates not be posted on EPA's website until Sept 1, 2019. Each engine family within CDX will have a request for approval (RFA) in the form a .pdf file containing relevant or required information in the format of [REDACTED]

Our fee filings for 2020 MY have been submitted and acknowledged by EPA on May 16, 2019.

**New Tailpipe Certification testing for MY20**

For MY20, Harley-Davidson will be certifying a new three wheeled Twin-cooled Trike model with a displacement of 1923 cc. This model, the FLHTCUTGSE, will be the new parental for the LHDXC1.92AEE engine family. A 15k full cert was run on this model. The 1868cc FLHTCUTG trike model is unchanged but will move under this new family. The oil-cooled FLRT trike model is also unchanged and will be carried over into the LHDXC1.87AEG engine family.

The 2019 Twin-cooled Trike Engine Family were certified as:

- KHDXC1.87AEE, (Precision Cooled Trike)

The 2020 Twin-Cooled Trike Engine Family will be certified as:

- LHDXC1.92AEE, (Precision Cooled 1923 and 1868 Trikes)

## Carryover Engine Families for MY20

To assist your processing, here is an overview of the certification plan for the remaining engine families for 2020 MY:

LHDXC0.88CEA: Two Wheeled 883 cc EFI “Sportsters”, 2-2 exhaust with heated O<sub>2</sub> sensors; with ½ catalysts.

Carry-Over

LHDXC01.2CEA: Two-Wheeled 1200 cc “Sportsters”, 2-2 exhaust with heated O<sub>2</sub> sensors; with ½ catalysts.

Carry-Over

LHDXC1.87AEH: Two-Wheeled 1746 cc & 1868 cc Oil Cooled, (OC), Softail, 2-2 exhaust with heated O<sub>2</sub> sensors and with Two- catalysts in mufflers.

Carry-Over for the 1746 cc Softail 2-2 models

Carry-Over for the 1868 cc Softail 2-2 models

LHDXC1.87AEJ: Two-Wheeled 1746 cc & 1868 cc Oil Cooled, (OC), Softail, 2-1-2 exhaust with heated O<sub>2</sub> sensors and Two- three-way catalysts in the header pipes.

Carry-Over for the 1746 cc Softail 2-1-2 models

Carry-Over for the 1868 cc Softail 2-1-2 models

LHDXC1.75AEK: Two-Wheeled 1746 cc Oil Cooled, (OC), Softail, 2-1 exhaust with heated O<sub>2</sub> sensors and with (1) three-way catalyst.

Carry-Over

LHDXC1.75AED; Two-Wheeled 1746 cc Oil Cooled, (OC), OEM Touring family, 2-1-2 exhaust with heated O<sub>2</sub> sensors and one three-way catalyst.

Carry-Over

LHDXC1.92AED: Two-Wheeled 1868, (OEM), & 1923, (CVO), cc Oil Cooled Touring family, 2-1-2 exhaust with heated O<sub>2</sub> sensors and one three-way catalyst. (In addition, there is the FXDRS 1868 cc Softail model added for 2019),

Carry-Over for the 1868 cc Touring models

Carry-Over for the 1923 cc CVO Touring (SE) models

Carry-Over for the 1868 cc FXDRS Softail model

LHDXC1.92AEF: Two-Wheeled 1868 and 1923 cc Precision-Cooled Touring family, 2-1-2 exhaust with heated O<sub>2</sub> sensors and one three-way catalyst.

Carry-Over for the 1868 cc Touring models

Carry-Over for the 1923 cc CVO Touring (SE) models

LHDXC1.87AEG: Three-Wheeled 1868 cc, Oil Cooled, (OC), 2-1-2 exhaust with heated O<sub>2</sub> sensors and one three-way catalyst.

Carry-Over

LHDXC0.50AXG: Two-Wheeled; 494 cc EFI with heated O<sub>2</sub> sensors; liquid cooled.

Carry-Over

## Carry-Over

## Carry-Over

## Permeation Test Results for 2020 Model Year

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Harley-Davidson engages in education of its dealer network to avoid adjustments ordinarily intended for closed course competitions which cause deviations from certified test results. Warnings against such adjustments are placed in the owners' manuals, Parts and Accessories catalogues, and additional educational materials distributed to the dealer network.

For purposes of communications related to our application, please feel free to contact us at your convenience. We appreciate your assistance and best regards,

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



## 2020 MY Emissions Control Devices

5/8/2019

### MY2020 XL Catalyst Information

### MY2020 Softail Family 1

### MY2020 Softail Family 2

### MY2020 Softail Family 3

### MY2020 Touring Catalyst Information

### MY2020 Trike Catalyst Information

### MY2020 XG500, XG750, XG750A Catalyst Information



The following limited warranty applies to the emission control system, is in addition to the MOTORCYCLE LIMITED WARRANTY and NOISE CONTROL SYSTEM LIMITED WARRANTY, and applies only to Harley-Davidson motorcycles certified for sale, registered, and normally operated in the U.S. Refer to the CALIFORNIA EMISSIONS CONTROL.

WARRANTY STATEMENT for additional warranty provisions applicable to California motorcycles.

Harley-Davidson Motor Company warrants to the first owner and each subsequent owner that this vehicle is designed, built, and equipped so as to conform at the time of sale with applicable regulations under section 7521 of Title 42 of the United States Code, and that it is free from defects in materials and workmanship which would cause this motorcycle to fail to conform with applicable regulations for five (5) years from the initial retail purchase and delivery from an authorized Harley-Davidson dealer (or five (5) years from the date the motorcycle is first placed in service, if it is first placed in service as a "demonstrator" or "company" motorcycle prior to delivery), or 30,000 km (18641 mi), whichever occurs first. Any unexpired portion of this limited warranty will be transferred to subsequent owners, upon the resale of the motorcycle during the warranty period.

THERE IS NO OTHER EXPRESS WARRANTY (OTHER THAN THE SEPARATE MOTORCYCLE AND NOISE LIMITED WARRANTIES) ON THE MOTORCYCLE. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE IS LIMITED TO THE DURATION OF THIS WARRANTY.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

The limited warranty period shall begin on the date the motorcycle is delivered to the first retail purchaser or, if the motorcycle is placed in service as a demonstrator or company motorcycle prior to sale at retail, on the date it is first placed in service.

THE FOLLOWING ITEMS ARE NOT COVERED BY THE EMISSION CONTROL SYSTEM LIMITED WARRANTY

1. Failures which arise as a result of misuse, tampering, alterations, accident, acts of nature, or improper or inadequate maintenance as specified in the Owner's Manual.
2. Required maintenance services (as specified in the Owner's Manual) and the replacement of parts (such as spark plugs, fuel and oil filters, etc.) used in required maintenance.
3. Any motorcycle on which the odometer mileage has been changed so that the mileage cannot be determined.
4. TO THE FULLEST EXTENT ALLOWED BY LAW, NEITHER HARLEY-DAVIDSON NOR ITS AUTHORIZED DEALERS SHALL BE LIABLE FOR LOSS OF TIME, INCONVENIENCE, TOWING OF THE VEHICLE, LOSS OF MOTORCYCLE USE, COMMERCIAL LOSS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

#### **Items Covered by this Emission Warranty**

The emission control system warranty may cover the following parts if the defect is deemed to be emissions-related:

- Air cleaner assembly
- Cam shaft
- Spark plug
- Ignition coil
- Ignition wires
- Vapor valve
- Catalytic converter
- Crankcase breather
- MAP sensor
- TMAP sensor
- Intake air temperature sensor
- Throttle position sensor
- Fuel injectors

- Induction module or throttle body
- Engine temperature sensor
- Electronic control unit
- Oxygen sensors

**Fuel Tank** (non-cosmetic failures only)

- Leaks
- Fuel vapor separator
- Fuel cap

If used on the above: hoses, clamps, fittings, tubing, sealing gaskets and mounting hardware.

Detailed instructions for proper maintenance and use of this motorcycle, including the time and/or mileage intervals at which such maintenance is to be performed, may be found in this Owner's Manual under [Service Records](#).

**Other Rights**

This limited warranty gives you specific legal rights, and you may have other rights which vary from state to state.

**Recommendations for Required Maintenance**

It is recommended that any emission system maintenance be performed by an authorized Harley-Davidson dealer using genuine Harley-Davidson replacement parts. However the maintenance, replacement or repair of the emissions control system may be performed by any other qualified service outlet or individual. Non-genuine Harley-Davidson parts may be used only if such parts are certified to comply with U.S. Environmental Protection Agency Standards.

EPA VIN Label PN	Model	"A" Engine Size	"B" Engine Family	"C" Model Year	"D" FEL	"E" Control Systems	"F" Permeation Family	"G" Octane Req.	Idle Speed rpm	"H" Muffler Identifier	"I" RPM
14002030	FLHR-ROAD KING	1746	LHDXC1.75AED	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	850 +/- 50	HARFLT1746/1868	2761
14002037	FLHX-STREET GLIDE	1746	LHDXC1.75AED	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	850 +/- 50	HARFLT1746/1868	2761
14002184	FLTRX-ROAD GLIDE	1746	LHDXC1.75AED	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	850 +/- 50	HARFLT1746/1868	2761
14002032	FLHT - ELECTRA GLIDE STANDARD	1746	LHDXC1.75AED	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	850 +/- 50	HARFLT1746/1868	2761
14002029	FLHP-POLICE ROAD KING	1868	LHDXC1.92AED	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002181	FLHTP-POLICE ELECTRA GLIDE	1868	LHDXC1.92AED	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002182	FLHXS-STREET GLIDE SPECIAL	1868	LHDXC1.92AED	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002185	FLTRXS-ROAD GLIDE SPECIAL	1868	LHDXC1.92AED	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002031	FLHRXS-ROAD KING SPECIAL	1868	LHDXC1.92AED	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002081	FLHXS-CVO STREET GLIDE	1923	LHDXC1.92AED	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	850 +/- 50	HARFLT1923	2668
14002038	FXDRS-FXDR 114	1868	LHDXC1.92AED	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL02	91	850 +/- 50	HARFXDR1868	2475
14002082	FLRT-FREE WHEELER	1868	LHDXC1.87AEG	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2613
14002033	FLHTCUTG - TRI GLIDE ULTRA	1868	LHDXC1.92AEE	2020	0.9	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002034	FLHTCUTGSE - CVO TRI GLIDE	1923	LHDXC1.92AEE	2020	0.9	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	850 +/- 50	HARFLT1923	2613
14002035	FLHTK-ULTRA LIMITED	1868	LHDXC1.92AEF	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002180	FLHTK-ULTRA LIMITED SHRINE EDITION	1868	LHDXC1.92AEF	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002183	FLTRK-ROAD GLIDE LIMITED	1868	LHDXC1.92AEF	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	950 +/- 50	HARFLT1746/1868	2761
14002036	FLHTKSE-CVO ULTRA LIMITED	1923	LHDXC1.92AEF	2020	0.7	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	850 +/- 50	HARFLT1923	2668
14002172	FLHC HERITAGE CLASSIC	1746	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2761
14002173	FLHCS HERITAGE CLASSIC 114	1868	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2613
14002028	FLFBS FAT BOY 114	1868	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2613
14002027	FLDE DELUXE	1746	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2761
14002174	FLSL SLIM	1746	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2761
14002177	FXBRS BREAKOUT 114	1868	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2613
14002175	FXBB-STREET BOB	1746	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2761
14002178	FXLR-LOW RIDER	1746	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2761
14002179	FXLRS-LOW RIDER SPECIAL	1868	LHDXC1.87AEH	2020	0.7	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	850 +/- 50	HARFX1746/1868	2613
14002039	FXFBS-FAT BOB 114	1868	LHDXC1.87AEJ	2020	1.4	SFI, 2 HO2S, 2 TWC	LHDXPMETAL02	91	850 +/- 50	HARFXF1746/1868	2613
14002083	FLSB - SPORTGLIDE	1746	LHDXC1.75AEK	2020	0.8	SFI, 2 HO2S, TWC	LHDXPMETAL02	91	850 +/- 50	HARFD1746	2761
14002045	XL 1200X-FORTY-EIGHT	1200	LHDXC01.2CEA	2020	0.6	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	1000 +/- 50	HARXL883/1200	3025
14002043	XL1200CX-ROADSTER	1200	LHDXC01.2CEA	2020	0.6	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	1000 +/- 50	HARXL883/1200	3025
14002044	XL 1200NS-IRON 1200	1200	LHDXC01.2CEA	2020	0.6	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	91	1000 +/- 50	HARXL883/1200	3025
14002046	XL 883N-IRON 883	883	LHDXC0.88CEA	2020	0.8	SFI, 2 HO2S, 2TWC	LHDXPMETAL02	89	1000 +/- 50	HARXL883/1200	3300
14002040	XG500-HARLEY-DAVIDSON STREET 500	494	LHDXC0.50AXG	2020	2.1	SFI, 2 HO2S	LHDXPMETAL03	87	1350 +/- 50	HARXG500/750	5037
14002041	XG750-HARLEY-DAVIDSON STREET 750	749	LHDXC0.75AXG	2020	0.3	SFI, 2 HO2S, TWC	LHDXPMETAL03	87	1350 +/- 50	HARXG500/750	4400
14002042	XG750A-STREET ROD	749	LHDXC0.75AXH	2020	0.3	SFI, 2 HO2S, TWC	LHDXPMETAL03	91	1350 +/- 50	HARXG750B	4813

VEHICLE EMISSION CONTROL INFORMATION  
 ENGINE DISPLACEMENT: "A" CC  
 ENGINE FAMILY: "B"  
 THIS VEHICLE CONFORMS TO USEPA  
 REGULATIONS APPLICABLE TO "C"  
 MODEL YEAR NEW MOTORCYCLES AND  
 IS CERTIFIED TO A  
 "D" HC + NOX G/KM/EL  
 ENGINE EXHAUST CONTROL SYSTEM  
 "E"  
 PERMEATION FAMILY: "F"  
 ENGINE TUNE UP SPECIFICATIONS:  
 SLOW IDLE: 1000 - 1050 RPM  
 IGNITION TIMING: AUTOMATICALLY  
 CONTROLLED NOT ADJUSTABLE  
 FUEL: UNLEADED GASOLINE ONLY  
 "G" (R+M)/2 PUMP OCTANE OR HIGHER  
 OIL: SEE OWNERS MANUAL

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THIS "C" "H" MOTORCYCLE  
 95921 MEETS ALL USEPA NOISE EMISSION  
 REQUIREMENTS OF 80 dB (A) AT "I" RPM  
 BY THE FEDERAL TEST PROCEDURE

WARNING: MODIFICATIONS WHICH  
 CAUSE THIS MOTORCYCLE TO  
 EXCEED FEDERAL NOISE AND  
 EMISSIONS STANDARDS ARE  
 PROHIBITED BY FEDERAL LAW  
 SEE OWNERS MANUAL

**Harley-Davidson  
Model Year 2020 OE  
Fuel Tank and Fuel/Vapor Lines Permeation  
Environmental Protection Agency Report**

27 March 2019

### Declaration Statement:

This report contains the permeation certification data and summary for the Harley-Davidson fuel tanks and fuel/vapor lines required to validate for 2020 EPA Permeation Regulations.

### Platforms:

The Harley-Davidson 2020 models are listed below (Only models sold in the DOM/CAL configurations & fuel tanks that are current production are shown. Non-current service tanks are not shown.):

Touring & Trike: FLHR, FLHP, FLRT, FLHRXS, FLHTP, FLHX, FLHT, FLHXS, FLHTKSE, FLHTK, FLTRX, FLTRXS, FLTRK, FLHTCUTG, FLHTCUTGSE, FLHXSE

Sportster: XL883N, XL1200CX, XL1200NS, XL1200X

Softail: FLSL, FLDE, FLHC, FLHCS, FLFBS, FLSB, FXLR, FXLRS, FXBR, FXBRS, FXBB, FXFBS, FXDRS

Street: XG500, XG750, XG750A

### Tank Family Information:

The tanks have been categorized into two family groups for consideration and tested accordingly. Surface area for seals and total tank inside surface area were used to determine the permeation worst case scenario. The surface areas were calculated with Computer Aided Design (CAD). The exposed surface area for the seals was calculated from CAD using the formulas found in EPA guidance document Cisd 07-02.

The two families are listed in Tables 1 and 2:

	EPA Tank Family Matrix						
	LHDXPMETAL02						
Criteria	(Metal Tank / Metal Plate w/Fluoroelastomer Seal)						
Model	XL883N, XL1200CX, XL1200NS	XL1200X	FLSL, FLDE, FLHC, FLHCS, FLFBS, FLSB	FXLR, FXLRS	FXBR, FXBRS, FXBB	FXFBS	FXDRS
Platform / Tank (H-D Reference Only)	XL Sport	XL Peanut	Softail DaVinci	Softail Stack	Softail Johnny Cash	Softail Jaws	Softail Sledge
Tank p/n	61348-07	61724-10	61000273	61000360	61000266	61000275	61000391
Tank Material	Steel	Steel	Steel	Steel	Steel	Steel	steel
Thickness (in)	0.044	0.044	0.036	0.036	0.036	0.036	0.036
Permeation Strategy	N/A for metal tank	N/A for metal tank	N/A for metal tank	N/A for metal tank	N/A for metal tank	N/A for metal tank	N/A for metal tank
Seal Exposed Surface Area (mm <sup>2</sup> )	2,666	2,666	2,905	2,905	2,905	2,905	2,905
Seal p/n	75301-07	75301-07	75301-07	75301-07	75301-07	75301-07	75301-07
Plate Seal Material	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer
Plate p/n - Fuel pump module	75268-07D	75268-07D	61200042	61200042	61200043	61200043	61200053
Outlet Seal Material	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer
Total Inside Surface Area (m <sup>2</sup> )	0.571	0.330	0.610	0.610	0.521	0.520	0.629
Tested			X				X
Worst case							

Table 1: Tank Family HHDXPMETAL02

	EPA Tank Family Matrix			
	LHDXP METAL03			
Criteria	(Metal Tank / Plastic Plate w/Fluoroelastomer Seal )			
Model	FLHR, FLHP, FLRT, FLHRXS	FLHTP, FLHX, FLHT, FLHXS, FLHTKSE, FLHTK, FLTRX, FLTRXS, FLTRK, FLHTCUTG, FLHTCUTGSE	FLHXSE	XG500, XG750, XG750A
Platform / Tank	FLT- sidefill	FLT-centerfill	FLT- sidefill	H-D Street
Tank p/n	61268-08	61356-08	61000189	61000021
Tank Material	Steel	Steel	Steel	Steel
Thickness (in)	0.044	0.044	0.044	0.044
Permeation Strategy	N/A for metal tank	N/A for metal tank	N/A for metal tank	N/A for metal tank
Seal Exposed Surface Area (mm <sup>2</sup> )	1,314	1,314	1,314	786
Seal p/n	61402-08	61402-08	61402-08	61200016
Plate Seal Material	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer
Plate p/n	75076-08B	75069-08D	75076-08B	61200001
Outlet Seal Material	Fluoroelastomer	Fluoroelastomer	Fluoroelastomer	N/A
Total Inside Surface Area (m <sup>2</sup> )	0.651	0.662	0.651	0.553
Tested		X		
Worst case				

Table 2: Tank Family HHDXP METAL03

## MY20 Permeation Certification

**ABSTRACT:** The test procedure for fuel tank permeation is specified in 40CFR1051.515 and the standard is 1.5 grams per square meter per day per 40CFR1051.110. For fuel lines and hoses, test procedure SAEJ1737, SAE J1527 or SAEJ30 was used at 23°C or 60°C using test fuel containing 90% gasoline and 10% ethanol with a limit of 15 grams per square meter per day. This report includes the permeation results for both the fuel tanks and the fuel lines for all Harley-Davidson vehicles sold domestically in model year 2020.

### Background:

From a material standpoint, there are nine different materials used on the fuel lines, vent hoses and crossovers. Each material was tested by the supplier and results tabulated in a spreadsheet with the data attached. For the fuel tanks, each platform was grouped into a tank family and the worst-case tanks for the two families were tested at Intertek and rated at less than the 1.5 grams per square meter per day for permeation. The tanks were divided up into two categories based on their tank construction and the material of the seal (Nitrile Rubber or Fluoroelastomer) and plate (Metal or Plastic). From there the fuel tank inside surface area was calculated along with the seal exposed surface area using CAD. The worst-case tanks had the combination of the highest seal exposed surface area and the highest inside surface area of the tank.

### Fuel Tanks:

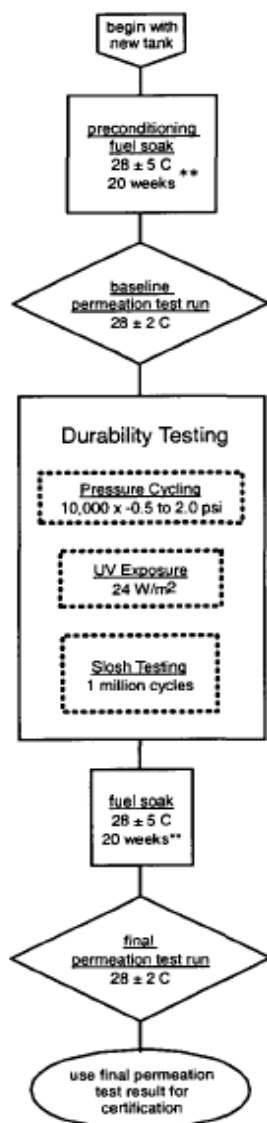
Fuel tank families were tested using the alternative procedure 1051.515 (Short Test without DF) listed below. Per allowance from EPA guidance document CCD-05-14 and our engineering judgement, the pressure/vacuum cycles portion of the test was not performed because H-D systems are designed to be zero pressure systems.

6. Summary of Alternatives

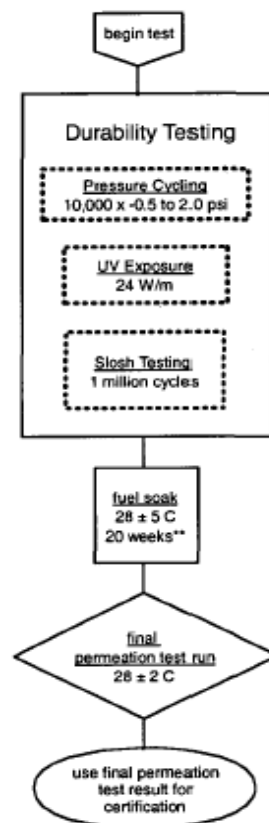
Procedure	§1051.515	Alternative
1. Preconditioning fuel soak	28±5°C for 20 weeks	43±5°C for 10 weeks
2. DF determination	Pre and post durability testing	Post durability testing only
3. Durability testing	Pressure-vacuum cycling UV exposure Slosh testing	Specified technologies/ applications where durability testing is not necessary
4. Metal tank testing	Use worst case tank	Use test rig

Flow Charts:

1: Full Test Procedure  
with DF\* Determination



2: Short Test without  
DF Determination



\* The deterioration factor (DF) is the difference between the baseline and final permeation test runs in the full test procedure. In future tests, the first 3 steps would be performed, then a DF could be applied to determine the final test result.

\*\* The length of "soak" during durability testing may be included in the fuel soak period provided that fuel remains in the tank. Soak periods can be shortened to 10 weeks if performed at 43 ± 5 C

Figure 1- EPA Flow Chart of Permeation Test Procedure 1051.515

The testing began with either a 20 week preconditioning period at 28 deg. C or a 10 week preconditioning period at 40 deg. C. During the preconditioning, the tanks were exposed to UV by the direct sunlight method for 450 hours. After the UV exposure, the tanks underwent 1,000,000 slosh cycles.

The final 28-day permeation test was performed with fresh fuel and the test results for the Harley-Davidson fuel tank families are shown in Table 3.

For MY20 family group # LHDXPMETAL02 is being retested as the Softail models will have new Seal Exposed Surface Area (mm<sup>2</sup>) values. We are retesting our worst-case tank (FXDRS) and anticipate we will have a new compliant Permeation Rate (g/m<sup>2</sup>/day) to report. For that particular tank the seal surface area is increasing by 4.87% (2905 mm<sup>2</sup> from 2770 mm<sup>2</sup>) however the seal material (fluorocarbon) is remaining the same. The value will be updated (along with a new appendix report) for the MY21 report.

## 2020 EPA Regulatory Test Results for Fuel Tanks

**Spec: Perm Rate less than 1.5 g/m<sup>2</sup>/day**

Family Group #	Tank Tested	Tanks in Family	Permeation Rate (g/m <sup>2</sup> /day)	Test Report
LHDXPMETAL02	FXDRS	XL883N, XL1200CX, XL1200NS, XL1200X, FLSL, FLDE, FLHC, FLHCS, FLFBS, FLSB, FXLR, FXLRS, FXBR, FXBRs, FXBB, FXFBS, FXDRS	1.101*	Appendix T1
LHDXPMETAL03	FLT-Center Fill	FLHR, FLHP, FLRT, FLHRXS, FLHTP, FLHX, FLHT, FLHXS, FLHTKSE, FLHTK, FLTRX, FLTRXS, FLTRK, FLHTCUTG, FLHTCUTGSE, FLHXSE, XG500, XG750, XG750A	0.768	Appendix T2

\* To be updated with MY20 test data

Table 3- Test Summary: 2020 MY Fuel Tank Permeation

## Fuel Lines and Hoses:

Table 4 shows the summary of the permeation data of the fuel lines, hoses and crossovers. All fuel and vent lines were tested using CE10 fuel. One vent line was tested using the test procedure SAE J1527 with a test temperature of 23°C. Another vent line was tested using the test procedure in SAE J1737 with a test temperature of 60°C which is generally considered more appropriate for plastic tubing. In this case the actual permeation rate at 60°C was recorded. Other vent lines were tested using the test procedure in SAE J30 with a test temperature of 23°C which is generally considered appropriate for rubber hoses.

Table 4 lists the nine different materials that Harley-Davidson uses for all of the fuel lines, vent hoses and crossovers along with cross sectional area and permeation results given by each supplier that tested their parts.



### Materials for Fuel Lines, Vent Hoses and Crossovers

Material	Material description	Test Report	Permeation g/m <sup>2</sup> /day	Cross sectional area (mm <sup>2</sup> )	Tested by Supplier	Test Temperature
Teleflex	Teflon T-52 conductive braided cover 90% E-glass, 10% Aramid	9B0598-1.1A	2.90	27.39	X	23°C
Green Bar 1200 w/ barrier	FKM core, THV barrier, ECO tie layer, aramid fiber reinforcement, ECO cover	Greenbar 1200	6.80	36.19	X	23°C
GreenBar 700-NR	NBR core, THV barrier layer, NBR tie layer, CM cover	Greenbar 700 NR	10.01	71.34	X	23°C
Leap II	FKM core, NBR center, ECO outer	DNBLPLINELP2	10.17	64.15	X	23°C
PVDF 2030	Nylon 12 or Nylon 612 core, PVDF barrier, Nylon 12 or Nylon 612 outer	DNBLPLINEDV3	3.76	28.19	X	23°C
FKM	Fluoroelastomer (FKM)	4670 FKM	7.11	19.27	X	23°C
Nylon PA11/ETFE	Conductive Nylon PA11 outer/ ETFE inner barrier	G13-1002D PA11- ETFE COND SPEC	0.8	21.99	X	23°C
PA 11 Mono Layer	Nylon 11	S13-0902D	10.3	28.26	X	23°C
FKM/ECO 70	FKM core, ECO outer	6110005127247-06A	10.53	84.82	X	23°C

Table 4 – Fuel Line, Vent Hose and Crossover Materials and Results

Tables 5 & 6 indicate all the part numbers for each of the four platforms. The test reports and the final permeation results are also shown in the chart. The vent hoses which are comprised of multiple materials are broken out into sub-components and the materials and results are listed separately.

# Permeation - MY20 Fuel lines and Hoses

Limit: 15 g/m<sup>2</sup>/day

Fuel: CE10

		Type	Part Number	Wall Thk. (mm)	Supplier	Materials	Test Report	(g/m <sup>2</sup> /day)
Softail	Fuel Line	fuel line	61200041	2.0	Nobel Automotive	Teleflex	Appendix H1	2.90
	Vent Line Assy, Tank to Canister	vent hose	60800048		Nobel Automotive	assembly see below		
	Vent Line Assy, Tank to ROV	vent hose	60800035		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Vent Line Assy, ROV to Canister	vent hose	60800044		Nobel Automotive	assembly see below		
	90 rubber end	connector	27250-96B	2.0	POA	FKM	Appendix H6	7.11
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Vent Line Assy, Tank to Atmosphere	vent hose	60800049		Nobel Automotive	assembly see below		
	Vent Line Assy, Tank to ROV	vent hose	60800035		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Vent Line Assy, ROV to Atmosphere	vent hose	60800043		Nobel Automotive	assembly see below		
	90 rubber end	connector	27250-96B	2.0	POA	FKM	Appendix H6	7.11
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Vent Line Assy, Canister to Purge Solenoid	vent hose	60800036		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Hose, Straight	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Vent Line Assy, Purge Solenoid to Induction Module	vent hose	60800037		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Hose, Straight	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
Touring; FLT/Trike	Fuel Line	fuel line	61200022	2.0	Nobel Automotive	Teleflex	Appendix H1	2.90
	Vent Line Assy, Tank to Canister	vent hose	27291-09A		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Vent Line Assy, Active Purge System	vent hose	60800026		Syncron	assembly see below		
	Vent Line Assy, Purge to Canister	vent hose	27298-09A		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Elbow	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Hose, Straight	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Vent line, canister to tank line (CAL)	vent hose	27297-09A	2.5	POA	Leap II	Appendix H4	10.17
	Purge Line, Solenoid to Throttle Body	vent hose	27439-09A		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Formed	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Hose, Straight	connector	POA	2.5	POA	Leap II	Appendix H4	10.17
	Vent line, tank line to atm (non CAL)	vent hose	27440-09A		Nobel Automotive	assembly see below		
	Nylon Tube	vent hose	POA	1.2	POA	PVDF 2030	Appendix H5	3.76
	Hose, Formed	connector	POA	2.5	POA	Leap II	Appendix H4	10.17

Table 5: – Softail & FLT/Trike Part Number Summary: MY20 Fuel Line Permeation

# Permeation - MY20 Fuel lines and Hoses

Limit: 15 g/m<sup>2</sup>/24hr

Fuel: CE98

Limit: 224hr

	Type	Part Number	Wall Thk. [mm]	Supplier	Material	Test Result	Limit	
Sportster	Fuel Line - Inlet (see part [P0000])	Fuel Line	E2485-18A	2.8	Makel Rotomation	Teflon	Aggreddio H1	2.38
	Fuel Line - Inlet (see part [Custom, Spare])	Fuel Line	E2551-87A	2.8	Makel Rotomation	Teflon	Aggreddio H1	2.38
	Fuel Line - Ring, Tank to ROV [Custom, Spare]	seal hose	E1100025		Makel Rotomation	assembly see below		
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	38 rubber pad	seal hose	27258-35D	2.8	P0A	FKM	Aggreddio H6	7.14
	Formed rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Fuel Line - Ring, Tank to ROV [P0000]	seal hose	E1100027		Makel Rotomation	assembly see below		
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	38 rubber pad	seal hose	27258-35D	2.8	P0A	FKM	Aggreddio H6	7.14
	Formed rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Hose, ROV in Air (see CAL-XL)	seal hose	E1100028	2.5	Ahuat	GerraBar 788-HR	Aggreddio H3	18.84
	Hose, ROV in Container	seal hose	E1100042		Makel Rotomation	assembly see below		
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	38 rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	38 rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Hose, Container in Solenoid	seal hose	E0000045		Makel Rotomation	assembly see below		
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	38 rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	38 rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Hose, Solenoid in Induction Module	seal hose	E0000023		Makel Rotomation	assembly see below		
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	38 rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	38 rubber pad	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
Street	Fuel Line - Tank to Dugout Filling	Fuel Line	E1200024	1.8	STI Sank	Hose PA11/ETFE	Aggreddio H7	8.7
	Fuel Line - Dugout Filling to Fuel rail	Fuel Line	E1200025	2.8	Casper Sld	Teflon	Aggreddio H1	2.38
	Fuel Line - Ring, Tank to Roll-over valve	seal hose	E1100014	3	Sank	PA11 Mono Layer	Aggreddio H8	18.3
		seal hose	P0A	2.5	Ahuat	GerraBar 788-HR	Aggreddio H3	18.84
		seal hose	P0A	2.5	Palquak	FKM/ECO 78	Aggreddio H3	18.53
	Fuel Line - Ring, Roll-over Valve to Container		E1100047		Makel			
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	Hose, Forward	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Hose, Straight	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Take up, Container in Solenoid		E1100048		Makel			
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	Hose, Forward	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Hose, Straight	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Take up, Solenoid in Throttle Body		E1100049		Makel			
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	2 Hoses, Straight	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Take up, Solenoid in Throttle Body "A"		E1100053		Makel			
	Hose Take	seal hose	P0A	1.2	P0A	PVDF 2858	Aggreddio H5	3.76
	Hose, Straight	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	3 Hoses, 38 degree	seal hose	P0A	2.5	P0A	Leap II	Aggreddio H4	18.17
	Hose, Valve in Air (see CAL)	seal hose	27856-84A	2.5	Ahuat	GerraBar 788-HR	Aggreddio H3	18.84
	Crossover	seal hose	E2551-88A	1.3	Ahuat	GerraBar 788 w/ barrier	Aggreddio H2	5.88

Table 6: – Sportster & Street Part Number Summary: MY20 Fuel Line Permeation

**Conclusion:**

After the completion of all permeation testing, the fuel tanks all passed the 1.5 grams per square meter per day test requirement. The fuel lines, vent hoses and crossovers also passed the 15 grams per square meter per day test requirement. Attached are the actual data and test reports submitted by the test facilities and suppliers.

**Additional Information:**

Additional supporting documentation is provided in the appendices. The contents of the appendices are as follows:

- Appendix T1 – EPA 1051 MY19 tanks 11-11-18
- Appendix T2 – EPA 1051 Moonshot tanks 6-23-17
- Appendix H1 – Teleflex 9B0598-1.1A
- Appendix H2 – GREENbar 1200
- Appendix H3 – GREENbar 700NR
- Appendix H4 – Leap II - DNBLPLINELP2
- Appendix H5 – PVDF 2030 - DNBLPLINEDV3
- Appendix H6 – Test Report #4670 FKM
- Appendix H7 - G13-1002D PA11-ETFE CONC SPEC
- Appendix H8 – Test Report S13-0902D
- Appendix H9 – Test Report 6110005127247-06A